3011
A592
51

TECHNICAL NOTE

FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

NORTHERN FOREST EXPERIMENT STATION
JUNEAU, ALASKA

No. 51

December, 1961

ESTIMATING SPRUCE AND HEMLOCK D.B.H. FROM STUMP DIAMETER

James T. Bones

Foresters occasionally must estimate tree volumes after the trees have been harvested and only the stumps remain. The relationships of d.b.h. and stump diameter of western hemlock (Tsuga heterophylla (Raf.) Sarg.) and Sitka spruce (Picea sitchensis (Bong.) Carr.) in southeast Alaska have been determined and are described below.

Studies in other regions 1/ 2/ 3/ show that the relationship between stump diameter and d.b.h. is linear. This type of relationship for spruce and hemlock in southeast Alaska was confirmed with stump diameters and corresponding d.b.h.'s measured in 1960 as part of timber cut studies and similar measurements from earlier studies.

An accurate estimate of d.b.h. from measurements of stump diameter can be obtained with the formula

$$y = ax$$

Where y = d.b.h.
x = diameter inside bark at stump height
a = the constant

1/ Bones, J. T. Estimating d.b.h. from stump diameter in the Pacific Northwest. Pacific Northwest Forest Expt. Sta. Research Note No. 186, 1 p. 1960.

2/ Cunningham, F. E., S. M. Filip, and M. J. Ferree. Relation of tree-stump diameter to diameter breast high. Northeastern Forest Expt. Sta. Station Note No. 1, 3 pp. 1947.

3/ Rapraeger, E. F. Determining tree d.b.h. from stump measurements. Northern Rocky Mtn. Forest and Range Expt. Sta. Research Note No. 16, 6 pp. 1941.

Values for the constant "a" in the formula, standard errors of estimate, and information about the sample trees used to determine the constants are:

	Constant	Standard error	Sample trees		
			Number	Average D.B.H. (inches)	Range of D.B.H.'s (inches)
Hemlock	.9434	.0058	257	26.2	11.3-58.1
Spruce	.9200	.0084	61	28.2	13.6-56.2

The average of two measurements of inside bark diameter (the second measurement is made at right angles to the first) multiplied by the appropriate constant gives an estimate of d.b.h. Gross volumes then may be estimated directly from local volume tables or from regional tables after determining tree or log height estimates from adjacent areas.

GPO 996933